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EXAMINER	
WILLIAMS, LAWRENCE B	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/965,242	RAGHAVAN ET AL.	
	Examiner	Art Unit	
	LAWRENCE B. WILLIAMS	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _RCE filed on 06/04/2008_.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _7-45_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) _45_ is/are allowed.

6)☒ Claim(s) _7-44_ is/are rejected.

7)☒ Claim(s) _40_ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 06/04/2008 has been entered.

Claim Objections

2. Claim 40 is objected to because of the following informalities: The examiner suggests "full range of the digitized signal" in line 2. Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 33-37 are rejected under 35 U.S.C. 112, second paragraph. Claim 33 recites the limitation "the center parameters" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Claims 34-37 are rejected based upon their dependency upon rejected claim 33.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 7, 32, 38, 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over McHale et al. (US Patent 5,781,617) in view of Wang (US Patent 5,822,368) and further in view of Wiley, deceased et al. (US Patent 4,864,309).

(1) With regard to claim 7, McHale et al. discloses in Fig. 13A, a serial/deserializer transmission system (abstract, McHale discloses combining signals from a plurality of modulators and providing the combined signal (serializing) to a plurality of demodulators (deserializing)), comprising: a plurality of demodulators (elements 644), each of the plurality of demodulators receiving signals from one of a plurality of transmission bands (McHale et al. discloses the signal from mixer (642) is a combined signal of frequencies f1-fn, col. 20, lines 16-26) are that are transmitted on a single electrically differential conductive pair (col. 1, line 65-col. 2, line 1, Fig. 11A discloses a differential receiver. Thus the transmission line from the mixer is a single electrically differential pair). McHale et al. discloses the demodulators (644) demodulating the combined signal at one of the frequencies f1-fn provided by a corresponding modulator (638) and providing the demodulated signal to an associated modem (col. 20, lines 25); wherein the plurality of demodulators recover data synchronously distributed across the plurality of transmission bands in the serial/deserializer transmission system (McHale et al. teaches the communications server (58) of Fig. 1, Fig. 13A, may detect frames or packets including HDLC. HDLC (high-level data link control) is a superset of SDLC (synchronous data

link control). Thus the data would be synchronized. McHale et al. also discloses the communications server connected to a communications network (64) which may also include a synchronous optical network (col. 6, lines 25-39). This necessarily indicates, in itself a synchronous system. McHale also discloses the communications network may include a frame relay network, T1, T3, E1, or E3 all which require synchronization at both ends of the transmission channel. Therefore being connected to these types of networks would obviously require that the data be synchronized. McHale et al. does not teach the exact make-up of the demodulator.

However, Wang discloses a demodulator for demodulating a transmitted signal having an analog down-converter (Fig. 5, element 510), a filter (Fig. 5, element 590), an A/D converter (Fig. 5, element 515), an equalizer (Fig. 5, element 570), and a decoder (Fig. 3, elements 310, 315). Wang discloses the elements of applicant's demodulator and the elements could easily be applied by one skilled in the art in the demodulator of McHale et al. to provide the data transmitted by the corresponding modulator (638).

Therefore, it would have been obvious to one of ordinary skill in the art at the time to provide the elements used by Wang to the demodulator of McHale et al. as a method of providing a demodulated signal of one the multiple frequencies (f1-fn) provided by a corresponding modulator (638) and provide a more reliable transmission system wherein the error rate is reduced.

Neither McHale nor Wang explictly disclose the plurality of the demodulators being synchronous to each other. However, synchronous demodulators are well known in the art.

Wiley discloses in Fig. 6 a plurality of demodulators (68) being synchronous to each other (col. 6, lines 15-30).

One of ordinary skill in the art would have been motivated to incorporate synchronous demodulators since synchronous sampling provides for simpler demodulators, reduces intersymbol interference and insures proper signal separation.

(2) With regard to claim 32, claim 32 inherits all limitations of claim 7, above. As noted above, the combination of McHale et al., Wang and Wiley et al. disclose all limitations of claim 7, above. Furthermore, Wang suggests the use of a complex equalizer (col.10, line 47-col. 11, line 14) executing a transfer function (col. 17, lines 36-42; Wang discloses the coefficients of the equalizer obtained from the in-phase channel response. Thus the equalizer would execute a transfer function with coefficients/parameters (both I and Q for the complex equalizer) per the channel response). Wang does not explictly teach the transfer function having parameters $C_k^x(j)$ and $C_k^y(j)$ where j is an integer. However, the complex equalizer of Wang would have coefficients/parameters for both I (x) and Q (y) since it is a complex equalizer and such parameters as noted by applicant would merely be a design choice.

One of ordinary skill in the art would have been motivated to include a complex equalizer as suggested by Wang as method of compensating for distortion such as intersymbol interference.

(3) With regard to claim 38, the steps claimed as method is nothing more than restating the function of the specific components of the apparatus as claimed in claim 7 above, and therefore would have been obvious, considering the aforementioned rejection for the apparatus claim 7.

(4) With regard to claim 44, claim 44 inherits all limitations of claim 38. Furthermore Wang also discloses adaptively choosing at least one operating parameter (Fig. 14). Wang teaches the updating of the equalizer dependent upon an initial channel response. Thus the operating parameter of the equalizer is adaptive depending upon the channel response.

Therefore, it would have been obvious to one of ordinary skill in the art at the time to adaptively choose an operating parameter of the equalizer to account for varying channel conditions.

7. Claims 8-9, 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of McHale et al. (US Patent 5,781,617), Wang (US Patent 5,822,368) and Wiley, deceased et al. (US Patent 4,864,309) as applied to claim 7, above and further in view of Baker (US Patent 6,163,563).

(1) With regard to claim 8, claim 8 inherits all limitations of claim 7. As noted above, the combination of McHale et al., Wang and Wiley et al. disclose all limitations of claim 7. Wang does not disclose the make-up of the analog down down-converter and as such does not teach wherein the analog down-converter creates an in-phase signal an a quadrature signal, the in-phase signal being an input signal multiplied by a cosine function at the frequency of one of the plurality of transmission bands and the quadrature signal being an input signal multiplied by a sine function of one of the plurality of transmission bands corresponding to that one of the plurality of demodulators. However, such functions of a down-converter are well known in the art as taught by Baker (Fig. 1, col. 4, line 58 - col. 5, line 11). Baker teaches the in-phase signal multiplied by a cosine function and the quadrature signal multiplied by a sin function. Though Baker is not specific at teaching the frequency, one of

ordinary skill in the art would know to choose the frequency based upon the upconverted baseband frequency. One skilled in the art would have used the down-conversion method as taught by Baker simply as a known method of producing the original baseband signal.

(2) With regard to claim 9, claim 9 inherits all limitations of claim 8. Furthermore, Baker discloses in Fig. 1 an in-phase filter (element 42) and a quadrature filter (element 44).

It would have been obvious to one of ordinary skill in the art at the time of invention to filter the in-phase and quadrature signals to remove noise and provide a more accurate signal representation.

(3) With regard to claim 15, claim 15 inherits all limitations of claim 8. As noted above, the combination of McHale et al., Wang, Wiley and Baker disclose all limitations of claim 8. Furthermore, Baker also discloses in Fig. 1, wherein the analog-to-digital converter includes a first analog-to-digital converter (element 46) coupled to receive signals from the in-phase filter and a second analog-to-digital converter (element 48) coupled to receive signals from the quadrature filter.

It would have been obvious to one of ordinary skill in the art at the time of invention to apply an analog-to-digital converter to receive signals from both the in-phase and quadrature filters simply as a known method to provide accurate digital samples of the in-phase and quadrature signals.

(4) Regarding claim 16, Wang also discloses a correction circuit (520, digital AGC) coupled between the analog-to-digital converter (515) and the equalizer (570).

One of ordinary skill in the art would have been motivated to include a correction circuit between the analog-to-digital converter and the equalizer as a method of compensation for varying amplitudes of the digital signal.

8. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of McHale et al. (US Patent 5,781,617), Wang (US Patent 5,822,368), Wiley, deceased et al. (US Patent 4,864,309) and Baker (US Patent 6,163,563) as applied to claim 9 above, and further in view of Brown et al. (US Patent 6,366,622 B1).

As noted above, the combination of McHale et al., Wang, Wiley et al. and Baker disclose all limitations of claim 9. They do not however teach the system further including an offset block coupled between the down-converter and the filter, the offset block offsetting the in-phase and quadrature signals such that signals output from the analog-to-digital converter averages zero.

However, Brown et al. discloses in Fig. 10, an offset block (DC. Cancel., 352, 354) coupled between the down-converter (I/Q direct down converter) and the filter (222, 224), the offset block offsetting the in-phase and quadrature signals such that signals output from the analog-to-digital converter averages zero (col. 18, lines 46-52; Brown et al. discloses the dc offset cancellation being applied directly after the down-conversion to both the I and Q, which would insure little or no dc offset at the digital-to-analog converter output (output from digital-to-analog converter averages zero).

One of ordinary skill in the art would have been motivated to apply an offset block offsetting the in-phase and quadrature signals to eliminate DC offset generated by the down conversion as a result of oscillator self-conversion.

9. Claims 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of McHale et al. (US Patent 5,781,617), Wang (US Patent 5,822,368), Wiley

deceased et al. (US Patent 4,864,309) and Baker (US Patent 6,163,563) as applied to claim 8 above, and further in view of Korn (US 2002/0024385 A1).

(1) With regard to claim 11, claim 11 inherits all limitations of claim 8 above. As noted above, the combination of McHale et al., Wang, Wiley, and Baker disclose all limitations of claim 8. They do not however explicitly disclose the system further including an amplifier coupled between the filter and the analog-to-digital converter, the amplifier amplifying an in-phase filtered signal from the in-phase filter and a quadrature filter signal from the quadrature filter such that the analog-to-digital converter is filled.

However, Korn discloses in Fig. 1, a system including an amplifier (24) coupled between a filter (22) and analog-to-digital converter (26), the amplifier amplifying the signal such that the analog-to-digital converter is filled (pg. 1, paragraph 0010; pg. 2, paragraph 0018; Korn discloses adjusting the gain of the variable gain amplifier to increase the dynamic range of the analog-to-digital converter to take advantage of the full dynamic range of the analog-to-digital converter).

Thus one skilled in the art would have been motivated to apply the teachings to an I and Q system to include an amplifier coupled between the filter and the analog-to-digital converter, the amplifier amplifying an in-phase filtered signal from the in-phase filter and a quadrature filter signal from the quadrature filter such that the analog-to-digital converter is filled to take advantage of the full dynamic range (i.e. resolution) of the analog-to-digital converter (pg. 2, paragraph 0018).

(2) With regard to claim 12, as noted above, Korn discloses an amplifier amplifying a signal such that an analog-to-digital converter is filled. Korn also discloses wherein the gain of

the amplifier is adaptively chosen in an automatic gain controller (Fig. 1, element, 28; pg. 2, Table 1 shows adaptability). One skilled in the art at the time of invention could readily modify the teachings of Korn to an I-Q system and would have been motivated to do so to compensate for the varying amplitude of the analog signal.

(3) Regarding claim 13, Korn also discloses in Fig. 1, wherein the automatic gain controller (Fig. 1 element 28) sets the gain based on digitized signals (D-out) from the analog-to-digital converter (26). One skilled in the art at the time of invention could readily modify the teachings of Korn to an I-Q system and would have been motivated to do so to as a method of monitoring the resolution of the analog-to-digital converter.

(4) Regarding claim 14, though Korn does not teach an I-Q system with gain, on skilled in the art at the time of invention could readily modify the teachings of Korn to an I-Q system and would have been motivated apply equal gain to the in-phase and quadrature signals in an effort to guard against unwanted distortions caused by differences in gain.

10. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of McHale et al. (US Patent 5,781,617), Wang (US Patent 5,822,368), Wiley, deceased et al. (US Patent 4,864,309), Baker (US Patent 6,163,563) as applied to claim 16 above and further in view of Iwamatsu (US Patent 6,034,564).

Claim 17 inherits all limitations of claim 16. As noted above, the combination of McHale et al., Wang, Wiley et al., and Baker disclose all limitations of claim 16. They do not however disclose wherein the correction circuit includes an adjustment to correct phases between the in-phase and quadrature signal.

However, Iwamatsu discloses a correction circuit (phase rotator, 130) situated between an analog-to-digital converter (126, 127) and an equalizer (129) which includes an adjustment to correct phases between an in-phase signal and a quadrature phase signal.

One of ordinary skill in the art at the time of invention would have been motivated to incorporate a correction circuit which includes an adjustment to correct phases between an in-phase and quadrature signal phase correction simply to insure proper phase alignment between the in-phase and quadrature signal.

11. Claims 18-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of McHale et al. (US Patent 5,781,617), Wang (US Patent 5,822,368), Wiley, deceased et al. (US Patent 4,864,309), Baker (US Patent 6,163,563 and Iwamatsu (US Patent 6,034,564) as applied to claim 17 above, and further in view of Koslov (US Patent 6,044,112).

(1) Regarding claim 18, claim 18 inherits all limitations of claim 17, above. As noted above, Iwamatsu discloses a correction circuit which includes an adjustment to correct phases between an in-phase and quadrature phase signal. Iwamatsu does not disclose the correction circuit wherein a small portion of one of the in-phase signal and the quadrature signal are added to the opposite one of the in-phase signal and the quadrature signal.

However, Koslov teaches a method and apparatus for correcting amplitude and phase imbalances in demodulators wherein he discloses a correction circuit wherein a small portion of one of the in-phase signal and the quadrature signal are added to the opposite one of the in-phase signal and the quadrature signal (col. 7, lines 18-35).

One of ordinary skill in the art at the time of invention would have been motivated to incorporate the teachings of Koslov as a method of correcting a phase imbalance between the in-phase and quadrature signals.

(2) Regarding claim 19, Koslov also discloses wherein a second portion of the opposite one of the in-phase and the quadrature signal is added to the opposite one of the in-phase and the quadrature signal (col. 10, line 30-col. 11, line 61; Koslov discloses the case where the net addition of the I component into the Q component is too large and adjusting the IQ_{gain} (portion added) accordingly to correct the phase imbalance.

One of ordinary skill in the art would have been motivated to incorporate the teachings to increase accuracy of the phase imbalance correction.

(3) Regarding claim 20, Koslov also discloses wherein the small portion and the second portion are adaptively chosen (col. 7, lines 37-45; Koslov discloses the IQ_{gain} (phase imbalance correction) signal as a function of the symbol values included in the complex signal output by the phase and amplitude imbalance correction circuit and the sliced symbol values output by the slicer. Thus the portions would be adaptively chosen based on the function of the symbol values included in the complex signal output by the phase and amplitude imbalance correction circuit and the sliced symbol values output by the slicer).

(4) Regarding claim 21, Koslov also discloses in Fig. 5, wherein the small portion is a function of the in-phase and quadrature signals output from the correction circuit (col. 7, lines 36-56).

One of ordinary skill in the art would have been motivated to incorporate the teachings to increase accuracy of the phase imbalance correction.

(5) Regarding claim 22, Koslov also discloses in Fig. 6B, wherein the second portion is a function of the ratio between in-phase and quadrature signals output from correction circuit (SIGN $Z_{SL, I}$, SIGN $Z_{SL, Q}$). The second portion is a function of the ratio of these two signals output from the correction circuit (col. 10, line 56 - col. 11, line 52).

One of ordinary skill in the art would have been motivated to incorporate the teachings to increase accuracy of the phase imbalance correction.

12. Claims 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of McHale et al. (US Patent 5781,617), Wang (US Patent 5,822,368), Wiley, deceased et al. (US Patent 4,864,309) and Baker (US Patent 6,163,563) as applied to claim 8 above, and further in view of LeFever (US Patent 4,599,732).

(1) Regarding claim 23, as noted above, the combination of McHale et al., Wang, Wiley, and Baker disclose all limitations of claim 8 above. They do not however disclose wherein a phase rotator circuit is coupled between the analog-to-digital converter and the equalizer.

However, LeFever discloses in Fig. 2, a technique for acquiring timing and frequency synchronization in which he teaches a receiver wherein a phase rotator circuit (38) is coupled between an analog-to-digital converter (31) and an equalizer (34).

It would have been obvious to one skilled in the art at the time of invention to incorporate the teachings of LeFever to perform instantaneous phase corrections (col. 5, lines 12-28).

(2) Regarding claim 24, LeFever also discloses wherein a parameter of the phase rotator circuit is adaptively chosen (col. 5, lines 29-62; LeFever discloses the phase rotator operating on phase information supplied through control signal (53) supplied by processor (41). Thus the

phase rotation parameters would be adaptive dependent upon the control signal supplied by the processor).

One skilled in the art would have been motivated to incorporate adaptability into the phase rotator simply to accommodate varying signal parameters of the in-phase and quadrature signals.

13. Claims 25, 28-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of McHale et al. (US Patent 5,781,617), Wang (US Patent 5,822,368), Wiley, deceased et al. (US Patent 4,864,309) and Baker (US Patent 6,163,563) as applied to claim 8 above, and further in view of Sasaki (US Patent 6,121,828).

(1) With regard to claim 25, claim 25 inherits all limitations of claim 8 above. As noted above, the combination of McHale et al., Wang, Wiley et al. and Baker disclose all limitations of claim 8. They do not however disclose wherein an amplifier is coupled between the equalizer and the decoder.

However, Sasaki discloses in Fig. 3, a demodulator wherein he teaches an amplifier (81, 82) coupled after an equalizer (70), the decoder (for QAM signals) though not shown would be inherent for the demodulator).

It would have been obvious to one skilled in the art at the time of invention to incorporate the teachings of Sasaki as a method of maintaining an average power output of the signals.

(2) With regard to claim 28, Sasaki also discloses wherein an in-phase gain and a quadrature gain of the amplifier are adaptively chosen from error signals calculated from sliced values (col. 4, line 60- col. 5, line 4).

It would have been obvious to one skilled in the art at the time of invention to incorporate the teachings of Sasaki as a method of maintaining an average power output of the signals.

(3) With regard to claim 29, Sasaki also discloses wherein the sliced values are determined from input signals (Fig. 3, output signals 6, 7) to the decoder (Again, though not disclosed, the decoder is inherent in the system).

It would have been obvious to one skilled in the art at the time of invention to incorporate the teachings of Sasaki as a method of maintaining an average power output of the signals.

14. Claims 26-27, 30-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of McHale et al. (US Patent 5,781,617), Wang (US Patent 5,822,368), Wiley, deceased et al. (US Patent 4,864,309) and Sasaki (US Patent 6,121,828) as applied to claim 25 above and further in view of Saulnier et al. (US Patent 4,878,029).

(1) Regarding claim 26, as noted above, the combination of McHale et al., Wang, Wiley et al., and Sasaki disclose all limitations of claim 26. They do not however disclose wherein a quadrature correction is coupled between the amplifier and the decoder.

However, Saulnier et al. discloses in Fig. 1, a complex digital sampling converter for demodulators wherein he teaches quadrature correction (34b, 34-2; col. 4, lines 17-33) before decoding (decoding would be inherent since Saulnier et al. discloses PSK modulation (col. 1, line 61). Saulnier et al. discloses the quadrature correction except for being located between an amplifier and a decoder. However, it would have been obvious to one having ordinary skill in the art at the time of invention to place the quadrature correction between an amplifier and decoder

to correct the error introduced by non-ideal quadrature sampling since it has been upheld that rearranging of parts of an invention involves only routine skill in the art.

(2) Regarding clam 27, Saulnier et al. also discloses an offset circuit (34-1, col. 4, lines 17-33, compensation delay) coupled with the quadrature correction and decoding (decoding would be inherent since Saulnier et al. discloses PSK modulation (col. 1, line 61).

Saulnier et al. discloses the offset circuit except for being located amplifier and a decoder. However, it would have been obvious to one having ordinary skill in the art at the time of invention to place the offset circuit between an amplifier and decoder to correct the offset (delay) between the in-phase and quadrature signals introduced since it has been upheld that rearranging of parts of an invention involves only routine skill in the art.

(3) Regarding claim 30, Saulnier et al. also discloses wherein a parameter of the quadrature correction is adaptively chosen (abstract; Saulnier et al. discloses the misalignment correction (quadrature correction means) correcting misalignment error in the concurrent I and Q streams. The correction itself would inherently be adaptive since the correction depends upon the misalignment of the I and Q streams).

It would be obvious to one of ordinary skill in the art at the time of invention to create the quadrature correction with an adaptive parameter to compensate for varying I and Q streams.

(4) Regarding claim 31, Saulnier et al. also discloses wherein a parameter of the offset circuit is adaptively chosen (col. 4, lines 17-33; Saulnier et al. discloses the offset circuit (compensation delay means) producing a delay corrected in-phase signal. The compensation itself would inherently be adaptive since the compensation depends upon the delay between the I and Q streams).

It would be obvious to one of ordinary skill in the art at the time of invention to create the quadrature correction with an adaptive parameter to compensate for varying I and Q streams.

15. Claim 33-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of McHale et al. (US Patent 5,781,617), Wang (US Patent 5,822,368), and Wiley, deceased et al. (US Patent 4,864,309) as applied to claim 32 above, and further in view of Isard et al. (US Patent 5,533,050).

(1) Regarding claim 33, claim 33 inherits all limitations of claim 32 above. As noted above, the combination of McHale et al., Wang and Wiley et al. disclose all limitations of claim 32. They do not disclose wherein the center parameters are fixed.

However, Isard et al. discloses fixed center parameters (col. 3, lines 33-40). It would have been obvious to one of ordinary skill in the art to fix the center parameters of the equalizer as a method of preventing quadrature error.

(2) Regarding claim 34, Isard et al. also discloses the parameters are set to zero (col. 3, lines 33-40).

It would have been obvious to one of ordinary skill in the art to fix the center parameters of the equalizer to zero as a method of preventing quadrature error.

(3) Regarding claim 35, Isard et al. also discloses wherein the parameters $C_k^x(-1) and C_k^y(-1)$ are fixed (col. 3, lines 15-20).

One of ordinary skill in the art at the time of invention would have been motivated to fix the parameters of $C_k^x(-1) and C_k^y(-1)$ as a method of rendering the impulse response symmetrical at the same time.

(4) Regarding claims 36-37, Isard et al. does not disclose the parameters as applicant discloses in claims 36-37. However, It would have been obvious to one having ordinary skill in the art at the time of invention to modify the parameters, since it has been held that that where the general condition of a claim are disclosed i the prior art, discovering the optimum or working ranges involves only routine skill in the art.

16. Claims 39, 41-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of McHale et al. (US Patent 5,781,617), Wang (US Patent 5,822,368) and Wiley, deceased et al. (US Patent 4,864,309) as applied to claim 7, above and further in view of Baker (US Patent 6,163,563).

(1) With regard to claim 39, claim 39 inherits all limitations of claim 38. As noted above, the combination of McHale et al., Wang and Wiley et al. disclose all limitations of claim 38. Wang does not disclose the specifics of the analog down down-converter and as such does not teach multiplying the input signal by a cosine function at the frequency of one of the plurality of transmission bands to obtain an in-phase signal; and multiplying the input signal by a sine function of one of the plurality of transmission bands to obtain a quadrature signal, wherein the baseband signal include the in-phase and the quadrature signal. However, such methods of down-conversion are well known in the art as taught by Baker (Fig. 1, col. 4, line 58 - col. 5, line 11). Baker teaches the in-phase signal multiplied by a cosine function and the quadrature signal multiplied by a sin function. Though Baker is not specific at teaching the frequency, one of ordinary skill in the art would know to choose the frequency based upon the upconverted baseband frequency. One skilled in the art would have used the down-

conversion method as taught by Baker simply as a known method of producing the original baseband signal.

(2) With regard to claim 41, Wang et al. also discloses in Fig. 5, adjusting the phase (element 580) between the in-phase signal and the quadrature signal of the baseband signal.

One of ordinary skill in the art would have been motivated to adjust the phase between the in-phase and quadrature signal to reduce the effects of I/Q imbalance.

(3) With regard to claim 42, Wang et al. discloses both an in-phase and quadrature correction (element 580-2).

One of ordinary skill in the art would have been motivated to provide quadrature correction to reduce the effects of I/Q imbalance.

(4) With regard to claim 43, Wang also discloses in Fig. 5, the method of claim 39 including slicing (element, 540) recovered data.

One of ordinary skill in the art would have been motivated to include slicing recovered data as a method of quantizing and correcting the recovered data.

17. Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over McHale et al. (US Patent 5,781,617) in view of Wang (US Patent 5,822,368) and further in view of Wiley, deceased et al. (US Patent 4,864,309) as applied to claim 38 above, and further in view of Brown et al. US Patent 6,366,622 B1) and Korn (US 2002/0024385 A1).

As noted above, the combination of McHale et al., Wang, and Wiley et al. disclose all limitations of claim 38. They do not however teach the method further including offsetting the baseband signal so that an averaged digitized signal is zero.

However, Brown et al. discloses in Fig. 10, an offset block (DC. Cancel., 352, 354) coupled between the down-converter (I/Q direct down converter, thus the signal is now baseband) and the filter (222, 224), the offset block offsetting the in-phase and quadrature signals such that signals output from the analog-to-digital converter averages zero (col. 18, lines 46-52; Brown et al. discloses the dc offset cancellation being applied directly after the down-conversion to both the I and Q, which would insure little or no dc offset at the digital-to-analog converter output (output from digital-to-analog converter averages zero).

One of ordinary skill in the art would have been motivated to apply an offset block offsetting the in-phase and quadrature signals to eliminate DC offset generated by the down conversion as a result of oscillator self-conversion.

Brown et al. does not disclose amplifying the baseband signal so that a full range of the digitized signal is obtained.

However, Korn discloses in Fig. 1, a system including an amplifier (24) coupled between a filter (22) and analog-to-digital converter (26), the amplifier amplifying the baseband signal so that a full range of the digitized signal is obtained. (pg. 1, paragraph 0010; pg. 2, paragraph 0018; Korn discloses adjusting the gain of the variable gain amplifier to increase the dynamic range of the analog-to-digital converter to take advantage of the full dynamic range of the analog-to-digital converter).

Thus one skilled in the art would have been motivated to apply the teachings to an I and Q system to include an amplifier coupled between the filter and the analog-to-digital converter, the amplifier amplifying an in-phase filtered signal from the in-phase filter and a quadrature filter signal from the quadrature filter such that the analog-to-digital converter is filled to take

advantage of the full dynamic range (i.e. resolution) of the analog-to-digital converter (pg. 2, paragraph 0018).

Allowable Subject Matter

18. Claim 45 is allowed.

19. The following is a statement of reasons for the indication of allowable subject matter: Claim 45 discloses a receiver system in a serial/deserializer system. A search of prior art records has failed to disclose wherein the

"the means for down-converting, means for obtaining, means for equalizing, and means for decoding for each of the plurality of transmission bands are synchronous to each other".

Conclusion

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lawrence B Williams whose telephone number is 571-272-3037. The examiner can normally be reached on Monday-Friday (8:00-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ghayour Mohammad can be reached on 571-272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Lawrence B. Williams

lbw
August 19, 2008

/Lawrence B Williams/
Primary Examiner, Art Unit 2611